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Pricing Eggs by the Pound

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Introduction

Because interior quality of eggs has been steadily improved, size of eggs has now become the principal variable in consumer selection from egg displays in retail food stores. Thus, there is some interest in pricing and selling eggs by the pound. In general, pricing items by the pound has increased in favor in retail food stores. This trend is observable in the pricing of such items as apples and bananas.

Objective of Study

The objective of this study was to compare consumer acceptance of eggs priced by the pound with eggs priced by the dozen. The total price per carton was to be held about equal for both methods in order to eliminate the effect of price differences on egg sales.

Review of Literature

Research workers at the Rhode Island station have suggested pricing eggs by the pound as a method of eliminating consumer misinformation on egg size classes:

> Consumers in this study did not receive higher quality by paying higher prices for dozens within the various size classes. This indicates that the price of eggs is not a primary concern to the average consumer. A wide range in prices was found within each size class with considerable overlapping between various size classes. A high price did not necessarily mean a larger size, nor was it necessarily an indicator of higher quality. A method which could be used to eliminate misunderstanding is that of reducing prices to a common denominator such as the pound and showing the price per pound as well as per package.[2]

Gabriel (1939) found that 9 percent of the respondents questioned expressed a preference for buying eggs by weight.[3]

Jasper and Cray (1950) found that only 1.3 percent of the housewives

[1]Associate Agricultural Economist, Louisiana Agricultural Experiment Station, Baton Rouge, La.

[2]F. R. Taylor, A. L. Owens, and A. W. Jasper, *Consumer Egg Quality, Size and Price Relationships,* Rhode Island Agricultural Experiment Station Bulletin 322, Kingston, R. I., February 1955, p. 7.

[3]Harry S. Gabriel, *Marketing of Eggs in Wilmington, Delaware,* Delaware Agricultural Experiment Station Bulletin 597, Newark, Del., 1939.

questioned expressed a preference for purchasing eggs by weight. Those favoring buying eggs by the pound had either been familiar with such a practice in another locality or had given the question some thought.[4]

Taylor, Owens, and Jasper (1952) reported that 22 percent of the housewives interviewed in Providence, Rhode Island, expressed a desire to buy eggs by the pound.[5]

McNiece reported that selling eggs by the pound would help poultry economists and poultry integrators devise a more efficient contract payment to growers. A dozen eggs does not provide a homogeneous contractual standard, because of egg size variation. A standard based on feed eaten divided by pounds of eggs produced would, however, be consistent. At present, a feed conversion ratio of 4.0 (pounds of feed per dozen eggs), in reality, means 2.67 pounds of feed per pound of egg.[6]

Several trade journals have indicated the possibilities of pricing eggs by the pound:

> The idea of selling and buying eggs on a weight basis, rather than by the dozen, has numerous advocates. It is based on the assumption that if consumers generally considered the protein value of eggs, in relationship to meat, for example, they would be more inclined to see how favorably eggs rank as a good buy. The hope of egg producers is that this would stimulate greater use of eggs. It is is pointed out in trade circles that at today's prices, eggs on a weight basis outrank even cheap hamburger meat as a good food buy.
>
> One Texas egg producer has price schedules on his eggs which tell the housewife the approximate weight of the eggs she is buying. For example, even if a dozen large eggs (weighing about one-and-a half pounds) costs 60 cents, the price per pound of food is only about 40 cents.
>
> The producer urges consumers to compare this cost per pound with the cost of other high protein foods they buy. A pound of egg has about the same food value as a pound of edible meat, and the meat you buy often has a considerable amount of waste bone and excess fat.[7]

A Minnesota hatcheryman claims that these advantages would result if eggs were sold by the pound:

> 1. The housewife would have a much better chance to compare values in regard to her protein needs. For instance, when beef sells for 79c a lb., pork for 69c a lb., and eggs for only 59c a lb., she has some basis on which to compare prices and values and will buy more eggs.
>
> 2. Another place where selling eggs by the pound (or weight)

[4]A. W. Jasper and R. E. Cray, *Consumer Preference for Eggs in Columbus, Ohio,* Ohio Agricultural Experiment Station Bul. 736, Wooster, Ohio, 1953.

[5]F. R. Taylor, A. L. Owens, and A. W. Jasper, *Preference Patterns for Eggs, Providence, Rhode Island,* Rhode Island Agricultural Experiment Station Bul. 321, Kingston, R. I., 1953.

[6]Dewey McNiece, *Economic Integration in Producing Table Eggs,* Unpublished Ph.D. Dissertation, L.S.U. Graduate School, Baton Rouge, La., 1961.

[7]*St. Louis Livestock Producer,* St. Louis, Mo., December, 1958.

would help the egg producer, is where some producer is producing real large eggs and is now selling them by the dozen and is being underpaid, as it costs him more to produce them. There used to be a market for extra large and fancy eggs, but not any more in this part of the country, so our egg packers cannot pay more for such large eggs.

3. Selling eggs by weight would also eliminate the handicap for an egg producer who has two egg buyers in his locality, where one packs a 23 oz. egg and the other packs a 24 oz. egg, but both pay the same price for No. 1 eggs, or some buyer has a real high price on the top grade but pay mostly on mediums.

4. It would cut down the handling cost of egg packers, as the only thing they would really have to check is egg quality.

5. It would most certainly eliminate the extra price differential between medium and large eggs, which has been a headache to the producer who has eggs that are just about a large size, but not quite, just on the borderline.[8]

Two Extension poultrymen from Washington State converted the price per dozen to price per pound for different seasons of the year (Table 1).

TABLE 1.—Grade AA Price Quotations Connected to Price per Pound, U. S. D. A., 1957-1958

	Price per Dozen			Price per Pound		
	Large	Medium	Small	Large	Medium	Small
July 1, 1957	$0.50	$0.41	$0.30	$0.34	$0.32	$0.27
Oct. 1, 1957	0.63	0.48	0.33	0.42	0.37	0.30
Jan. 1, 1958	0.65	0.57	0.48	0.44	0.44	0.43
Apr. 1, 1958	0.57	0.51	0.41	0.38	0.39	0.37
July 1, 1958	0.55	0.43	0.32	0.37	0.33	0.29

Source: Grotts and Jenkins, *Washcoegg*, Seattle, Wash., November, 1958.

In the fall when pullet production is just beginning there is a large supply of "small" eggs in relation to the supply of larger eggs. During the winter this difference evens out to reappear again, to a lesser extent, during the summer. Naturally this variation affects price differentials between the sizes.

The data show that during the past year, according to the price per dozen quotations, small eggs were the best buy on a per pound basis (Table 1).

The difference in value was greatest in the fall. By January 1, there was no difference and by July 1 the value per pound between these three sizes had begun to widen again.[9]

Method of Study

No controlled experiments have been conducted to determine the feasibility of pricing and selling eggs by the pound. In order to obtain

[8]Letter written by Charles Biersma of Winnebago Hatchery, Winnebago, Minn., to the Editor of *Egg Producer*, January, 1959.

[9]R. F. Grotts and W. R. Jenkins, *Washcoegg*, Seattle, Wash., November, 1958.

reliable results on this problem, a Latin square experiment was utilized, consisting of a 3 x 3 design. This design means that three variables are tested for three weeks in three different stores.

The design of the egg pricing experiment (Table 2) was replicated twice. The experiment ran six weekends in three supermarkets. The tests were conducted on Thursday, Friday, and Saturday of each week.

TABLE 2.—Latin Square Design for Experiment on Egg Pricing Methods, Three Lake Charles Supermarkets, Louisiana, June-July, 1961

Weekend	Eggs Priced:		
	by the dozen	½ by dozen ½ by pound	by the pound
June 15 - 17	Store No. 1	Store No. 2	Store No. 3
June 22 - 23 - 24	Store No. 3	Store No. 1	Store No. 2
June 29-30 - July 1	Store No. 2	Store No. 3	Store No. 1
July 6 - 7 - 8	Store No. 3	Store No. 1	Store No. 2
July 13 - 14 - 15	Store No. 2	Store No. 3	Store No. 1
July 20 - 21 - 22	Store No. 1	Store No. 2	Store No. 3

Location of Study

The study was conducted in three supermarkets owned by one corporation in the city of Lake Charles, Louisiana. The corporation is a member of the Independent Grocers (I.G.) Co-op of Lake Charles. The three supermarkets were representative of the medium-sized, neighborhood supermarket. Each store had two check-out counters. One supermarket was located in a high-income neighborhood, one in a middle-income area, and one in a low-income area. The president of the corporation selected the stores.

Conducting the Test

At the beginning of each test period, eggs in dozen cartons were weighed to determine their average net weights. In each test, the large eggs averaged 26 ounces, and medium eggs, 23.

The store manager, set the price on eggs sold by the dozen for both large and medium eggs. The price of eggs sold by the pound was set so that the total returns from a dozen priced in this way would approximately equal returns for the cartons of eggs priced by the dozen. Therefore, price

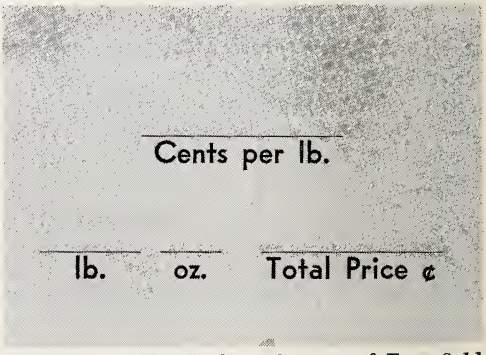

Figure 1.—Label Used on Cartons of Eggs Sold by the Pound, 1961.

levels did not enter the experiment. An illustration of the labels used on cartons sold by the pound is shown in Figure 1. From the labels, prospective purchasers could see the price per pound, the weight, and total price of a dozen eggs.

Table 3 shows the "conversion" table used to convert price-by-the-dozen to price-by-the-pound and vice versa.

TABLE 3.—Egg Prices per Dozen Converted to Prices per Pound

Price per Dozen (Cents)	Mediums 23 Ounces	Large 26 Ounces
	Cents per Pound	
39	27	24
41	28	25
43	30	26
45	31	27
47	33	29
49	34	30
51	35	31
53	37	33
55	38	34
57	39	35

Source: Egg Price Conversion Tables, U.S.D.A., Washington, D.C.

Medium- and large-egg cartons used to compare eggs sold by the dozen with those sold by the pound are pictured in Figure 2.

Figure 2.—Store Display Showing Cartoned Eggs Sold by the Dozen Versus the Pound.

Prices during the two trials are shown in Table 4. Each store followed about the same price schedule except for an occasional one to two cents per dozen price reduction on eggs that had been on display for some time.

TABLE 4.—Egg Prices per Dozen and per Pound for the First and Second Trials, Lake Charles Supermarkets Participating in the Experiment, June - July, 1961

Trial	Weeks	Cents per Dozen		Cents per Pound	
		Large	Medium	Large	Medium
I	Week 1	57	49	35	35
	Week 2	53	39[a]	33	27[a]
	Week 3	55	49	34	34
II	Week 4	53	47	33	33
	Week 5	57	49	35	35
	Week 6	57	49	35	35

[a]Medium eggs were used as a "special" by all three stores.

Eggs were candled at regular intervals to insure Grade A interior quality. Eggs were procured from a local egg producer-packer. Deliveries to food stores were made twice weekly on Monday and Thursday. Whenever one store ran short, eggs were transferred from one of the other stores so that all displays were properly maintained.

Check-out procedures were not altered. Eggs priced by the pound were registered according to the total price indicated on the label.

Egg pricing procedures used by the stores usually consisted of a pre-weekend price and a weekend price. The former applied to Monday, Tuesday, and Wednesday, the latter to Thursday, Friday, and Saturday. In addition, two stores stayed open on Sunday mornings and sometimes a third egg price was applicable for that day. For this experiment, only weekend prices were of interest. A special sale on medium eggs during the second week of the first trial provided the only deviation from the pricing techniques previously described. This deviation was due to a prior agreement by all members of the I.G. Co-op Food Stores to follow price specials announced by the Co-op. Eggs sold in all three stores had the same low prices; therefore, no particular treatment benefited from this price reduction.

Results of Study

Effect of Pricing Technique on Egg Sales

Table 5 presents a summary (for each day of the two trials) of the number of customers in the stores, of egg sales in dozens, and of egg sales per 100 customers.

Egg sales averaged 5.94, 6.05, and 5.75 dozens per 100 customers for displays containing only eggs priced by the dozen, an equal number of eggs priced by the dozen and by the pound, and for eggs priced only by the pound, respectively. *These small differences in sales of eggs could be due to chance variation. They were not significant at the 5 percent confidence level* (Appendix Tables 1 and 2).

TABLE 5.—Customer Units, Total Egg Sales, and Sales per 100 Customers, by Day, First and Second Trials, Three Lake Charles Supermarkets, June - July, 1961

Dates	Priced by the Dozen			Priced by Dozen & Pound			Priced All by the Pound		
	Customers	Dozen Sold	Dozen per 100 Cust.	Customers	Dozen Sold	Dozen per 100 Cust.	Customers	Dozen Sold	Dozen per 100 Cust.
First Trial:									
June 15	804	32	3.98	627	25	3.99	587	5	0.85
16	929	63	6.78	682	49	7.18	570	29	5.09
17	1,124	72	6.41	847	55	6.49	517	17	3.29
22	471	31	6.58	800	43	5.38	597	45	7.54
23	508	53	10.43	914	71	7.77	746	53	7.10
24	535	36	6.73	1,196	136	11.37	938	117	12.47
29	439	36	8.20	369	5	1.36	661	25	3.78
30	634	49	7.73	396	15	3.79	858	45	5.24
July 1	839	40	4.77	416	16	3.85	1,019	60	5.72
Subtotal	6,283	412	6.56	6,247	415	6.64	6,523	396	6.07
Second Trial:									
July 6	368	15	4.08	749	28	3.74	400	24	6.00
7	408	15	3.68	818	55	6.72	579	43	7.43
8	443	20	4.51	1,051	73	6.95	792	57	7.20
13	486	20	4.12	407	12	2.95	722	26	3.60
14	661	47	7.11	466	22	4.72	944	52	5.51
15	824	38	4.61	480	25	5.21	1,066	54	5.07
20	693	20	2.89	514	26	5.06	387	10	2.58
21	892	64	7.17	607	26	4.28	380	20	5.26
22	1,080	70	6.48	746	49	6.57	422	20	4.74
Subtotal	5,855	309	5.28	5,838	316	5.41	5,692	306	5.38
Grand Total	12,138	721	5.94	12,085	731	6.05	12,215	702	5.75

Egg sales were adjusted for number of customers in each store to remove the effects of customer traffic on egg sales. The adjusted sales per 100 customers by treatments were as follows:

Treatment	Dozens Sold per 100 Customers	
	Unadjusted Value	Adjusted Value
(A) Priced by Dozen	5.94	5.94
(B) Priced by Pound	5.75	5.71
(C) Priced by Dozen and Pound	6.05	6.09
Average, All Treatments	5.91	5.91

An analysis was made of egg sales by the pound versus by the dozen when displayed side-by-side under Treatment C (Table 6). Eggs priced by the dozen accounted for 45 percent of the sales and those priced by the pound, 55 percent. This difference was subjected to a chi-square test (Appendix Table 3). *The differences in percentage of total sales between the two were significant.*

Sales Differences Among Stores

Store No. 1 had the most customer traffic and egg sales, but ranked second in egg sales per 100 customers (Table 7). This store was located in a low-income neighborhood.

TABLE 6.—Sales of Eggs Priced by the Dozen and by the Pound, Two Trials, Three Lake Charles Supermarkets, June - July, 1961.

Date	Half-Half Display Sales			
	Sales by Dozen	Sales by Pound	Percentage	
			Dozen	Pound
June 15	9	16	36	64
16	23	26	47	53
17	32	23	58	42
22	21	22	49	51
23	23	48	32	68
24	50	86	37	63
29	2	3	40	60
30	11	4	73	27
July 1	10	6	63	37
Subtotal	181	234	43.6	56.4
July 6	17	11	61	39
7	30	25	55	45
8	35	38	48	52
13	9	3	75	25
14	8	14	36	64
15	13	12	52	48
20	14	12	54	46
21	10	16	38	62
22	11	38	22	78
Subtotal	147	169	47	53
Grand Total	328	403	45	55

Store No. 2 had the second highest egg sales and customer traffic and the highest sales per 100 customers. It was located in a middle-income neighborhood.

Store No. 3 had the fewest customers, lowest egg sales, and lowest sales per 100 customers. It was located in a high-income neighborhood.

TABLE 7.—Customer Traffic and Egg Sales by Stores for the First, Second, and Combined Trials, Three Lake Charles Supermarkets, June-July, 1961

	Store No. 1			Store No. 2			Store No. 3		
	Customers	Dozen	Dozen per Customer	Customers	Dozen	Dozen per Customer	Customers	Dozen	Dozen per Customer
First Trial	8,335	547	6.56	6,349	469	7.39	4,369	207	4.74
Second Trial	8,015	442	5.51	5,609	330	5.88	3,761	159	4.23
Combined Trials	16,350	989	6.05	11,958	799	6.68	8,130	366	4.50

Sales Differences Among Weeks

The variation by weeks for customer traffic, egg sales, and sales per 100 customers for combined trials was tabulated. During week 2, customer traffic, total egg sales, and sales per 100 customers were highest in the six weeks of the experiment. This phenomenon was probably due

TABLE 8.—Egg Sales by Size of Egg, Two Trials, Three Lake Charles Supermarkets, June-July, 1961

Dates	Sales by Size			Percentage	
	Large	Medium	Total	Large	Medium
June 15	12	50	62	19.4	80.6
16	38	103	141	27.0	73.0
17	56	88	144	38.9	61.1
22	23	96[a]	119	19.3	80.7
23	32	145[a]	177	18.1	81.9
24	92	197[a]	289	31.8	68.2
29	20	46	66	30.3	69.7
30	34	75	109	31.2	68.8
July 1	55	61	116	47.4	52.6
Subtotal	362	861	1,223	29.6	70.4
July 6	21	46	67	31.3	68.7
7	25	88	113	22.1	77.9
8	35	115	150	23.3	76.7
13	18	40	58	31.0	69.0
14	34	87	121	28.1	71.9
15	36	81	117	30.8	69.2
20	20	36	56	35.7	64.3
21	44	66	110	40.0	60.0
22	50	89	139	36.0	64.0
Subtotal	283	648	931	30.4	69.6
Grand Total	645	1,509	2,154	29.9	70.1

[a]Special sale on medium eggs.

to the "special" sale conducted on medium eggs and "price specials" on a number of other basic food items.

An analysis for days of the week showed that Thursday accounted for 20 percent of egg sales; Friday, 36 percent; and Saturday, 44 percent. Egg sales per 100 customers were also highest for Saturday and lowest on Thursday.

Sales Differences Between Sizes of Eggs

Table 8 shows a tabular analysis of total egg sales by size of egg. Medium eggs accounted for 70.1 percent of sales, and large eggs, 29.9 percent. No small eggs were sold.

The main reasons for medium eggs outselling large eggs were: (1) large eggs were priced higher per dozen, and (2) medium eggs weighing 23 ounces per dozen probably gave consumers eggs of adequate size, in most cases.

Conclusions

The conventional marketing system for eggs sold through food stores is from *grower* to *egg dealer-packer* to *retail store* to *consumer.*

The study showed that, when all three treatments (A, B, and C)[10] were analyzed together, consumers were apparently just as satisfied to purchase by the pound as by the dozen. A separate analysis was made of the treatment in which eggs were sold by the pound and by the dozen, side-by-side. In this treatment consumers actually purchased 55 percent by the pound and 45 percent by the dozen. Statistical analysis of this data indicated this difference in purchases was not due to chance but was "statistically significant."

This strengthens the earlier conclusion that consumers are at least indifferent to pricing eggs by the pound, and even suggests a possible preference for this method of pricing.

Appraisal

If the new pricing technique were to be used, the *food store* and the *egg packer* would be most involved.

Under present conditions, the *food store* may hesitate to change its pricing method, primarily because of the extra cost in pricing eggs by the pound. The extra labor involved in pricing eggs by the pound in retail stores, as compared with conventional pricing, consists of *labeling and weighing each individual carton and consulting "conversion" charts* for proper pricing. All other steps in displaying and merchandising the eggs are about the same.

A limited time and motion study was conducted during the experiment to ascertain the extent of this extra cost in pricing eggs by the pound. It would amount to about 1.7 cents per dozen if all store labor

[10]Treatment A, eggs sold by the dozen; Treatment B, by the pound; Treatment C, by the dozen and by the pound.

is fully employed and new employees were hired at $1.00 per hour. If store labor is available and otherwise not busy, the extra cost would be nil.

Under existing conditions, if a store or supermarket operator desires to sell eggs by the pound, one recommendation would be to shift the egg pricing operation to the "produce weigher" in the supermarket.

Another possibility for storekeepers is to sell eggs loose in a rubber-coated wire basket displayed alongside the cartoned eggs. The loose eggs could be sold by the pound when a customer wants less than one dozen. Regular paper bags could be used for such purchases, with EGGS - FRAGILE marked on the paper bags.

However, the food store is limited in selling eggs by the pound unless the *egg packer* adapts to this system. The egg packer could facilitate pricing by the pound, by marking the net weight on each carton at the plant. This might involve extra costs for the packer in handling and equipment for which he may or may not be compensated.

If eggs could be bought and sold by the pound, marketing margins could be set on a per-pound basis.

The discussion so far refers to one store and one packer selling eggs by the pound in a marketing system that sells eggs by the dozen. If substantial numbers in the egg market converted to a per-pound basis, it is conceivable that some economies could arise; for instance, it would be easier to weigh a carton of eggs than size individual eggs for a carton.

(*See Pages 14 and 15 for Appendix Tables*)

Appendix Tables

TABLE 1.—Analysis of Variance for Customer Units (x), Combined Trials, Three Lake Charles Supermarkets, Louisiana, 1961

Source of Variance	D.O.F.	Sums of Squares	Mean Square
Trials	1	154,568	154,568
Weeks Within Trials	4	274,293	68,573
Weeks	2	164,020	82,010
Weeks x Trials	2	110,273	55,136.5
Stores Within Trials	4	5,654,912	1,413,728
Stores	2	5,639,536	2,819,768
Stores x Trials	2	15,376	7,688
Treatments Within Trials	4	20,361	5,090.25
Treatments	2	1,424.3	712.15
Treatments x Trials	2	18,936.7	9,468.35
Errors Within Trials	4	11,890	5,945

$$\text{Weeks: F (Variance Ratio)}_{(2,4)} = \frac{82{,}010}{5{,}945} = 13.79^{*}$$

$$\text{Stores: F (Variance Ratio)}_{(2,4)} = \frac{2{,}819{,}768}{5{,}945} = 474.30^{**}$$

$$\text{Treatments: F (Variance Ratio)}_{(2,4)} = \frac{712.15}{5{,}945} = .12$$

*5% level = 6.94
**1% level = 18.00

TABLE 2.—Analysis of Variance for Egg Sales (y), Combined Trials, 1961

Source of Variance	D.O.F.	Sums of Squares	Mean Squares
Trials	1	4,737.0	4,737.00
Weeks Within Trials	4	16,453.0	4,113.25
Weeks	2	7,189.0	3,594.50
Weeks x Trials	2	9,264.0	4,632.00
Stores Within Trials	4	34,689.0	8,672.25
Stores	2	33,984.3	16,992.15
Stores x Trials	2	704.7	352.25
Treatments Within Trials	4	87.0	43.50
Treatments	2	72.3	36.15
Treatments x Trials	2	14.7	7.35
Errors Within Trials	4	908.0	227.00

$$\text{Weeks: F (Variance Ratio)}_{(2,4)} = \frac{3{,}594.5}{227} = 15.83^{*}$$

$$\text{Stores: F (Variance Ratio)}_{(2,4)} = \frac{16{,}992.15}{227} = 748.55^{**}$$

$$\text{Treatments: F (Variance Ratio)}_{(2,4)} = \frac{36.15}{227} = .16$$

*5% level = 6.94
**1% level = 18.00

TABLE 3.—Chi-Square Analysis, Sales by the Pound vs. Sales by the Dozen, Combined Trials

Item	D.O.F.	Chi-Square Value
First Trial		
Week 1	1	15.380
Week 2	1	.008
Week 3	1	2.778
Second Trial		
Week 1	1	.410
Week 2	1	.017
Week 3	1	9.515
Pooled X^2	6	28.108
Total	1	7.695*
Difference (Heterogeneity)	5	20.413* Significant at the 1% level

$$X^2 = \frac{2(328.0-365.5)^2}{365.5} = \frac{2(-37.5)^2}{365.5} = \frac{2(1406.25)}{365.5} = \frac{2812.50}{365.5} = 7.695^*$$